Claims

[c1] 1.An acicular body comprising at least one inorganic compound of a metal selected from the group consisting of Groups IB, IIA, IIB, IIIA, IIIB, IVA, IVB, VA, VB, VIA, VIB, VIIA, VIIB, VIIIA, rare earth metals of the Periodic Table, and mixtures thereof.

[c2] 2.The acicular body according to claim 1, wherein said at least one inorganic compound of a metal is an oxide of said metal.

[c3] 3.The acicular body according to claim 2 having a cross-sectional dimension less than about 20 μ m.

[c4] 4.The acicular body according to claim 2 having a cross-sectional dimension preferably less than about 10 μ m, more preferably less than about 5 μ m.

[c5] 5.An acicular body comprising at least one oxide of at least one metal selected from the group consisting of Groups IIA, IIIA, IIIB, IVA rare earth metals of the Periodic Table, and mixtures thereof.

[c6] 6.An acicular body comprising at least one oxide of at least one metal selected from the group consisting of scandium, yttrium, lanthanum, aluminum, gallium, indium, thallium, cesium, praseodymium, neodymium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, and mixtures thereof.

[c7] 7.A method for producing acicular bodies of at least one inorganic compound of a metal comprising the steps of:

preparing a solution of a precursor of said inorganic compound of said metal to obtain a first solution;

preparing a solution of an ester of a dicarboxylic acid to obtain a second solution;

adding said first solution in increments into said second solution to form a mixed solution and to obtain an acicular-shaped precipitate of an organic salt of said metal from said mixed solution;

separating said precipitate from said mixed solution;

drying said separated precipitate; and

firing said dried precipitate in an oxidizing atmosphere at a temperature for a time sufficient to convert said organic salt of said metal to acicular bodies of said inorganic compound of said metal;

wherein said metal is selected from the group consisting of Groups IA, IB, IIA, IIB, IIIA, IIIB, IVA, IVB, VA, VB, VIA, VIB, VIIA, VIIB, VIIIA, and rare earth metals of the Periodic Table, and mixtures thereof.

[c8] 8.The method according to claim 7, wherein said at least one compound of said metal is an oxide of said metal.

[c9] 9.The method according to claim 7, wherein said precursor of said inorganic compound of said metal is soluble in water.

[c10] 10.The method according to claim 7, wherein said first solution is an acidic solution comprising an acid selected from the group consisting of hydrochloric acid, nitric acid, sulfuric acid, citric acid, acetic acid, and mixtures thereof.

[c11] 11.The method according to claim 7, wherein said dicarboxylic acid is selected from the group consisting of oxalic acid, malonic acid, succinic acid, glutaric acid, and mixtures thereof.

[c12] 12.The method according to claim 11, wherein said ester is selected from the group consisting of methyl, ethyl, propyl, dimethyl, diethyl, dipropyl esters, and mixtures thereof.

[c13] 13.The method according to claim 7, wherein said ester is selected from the group consisting of dimethyl oxalate, diethyl oxalate, and mixtures thereof.

[c14] 14.The method according to claim 7, wherein said inorganic compound of said metal is an oxide of said metal.

[c15] 15.The method according to claim 7, wherein said drying is carried out above a boiling point of a liquid of said mixed solution for a time sufficient substantially to remove a liquid from said precipitate.

[c16] 16.The method according to claim 7, wherein said firing is carried out at a temperature from about 400 ^{0} C to about 1400 ^{0} C.

[c17] 17.The method according to claim 7, wherein said firing is carried out for about 4 hours.

[c18] 18.The method according to claim 7, wherein said oxidizing atmosphere is selected from the group consisting of air, oxygen, carbon dioxide, mixtures of oxygen and at least one inert gas, and mixtures thereof.

[c19] 19.A method for producing acicular bodies of at least one inorganic compound of a metal comprising the steps of:

preparing a solution of a precursor of said inorganic compound of said metal to obtain a first solution;

preparing a solution of an ester of a dicarboxylic acid to obtain a second solution;

adding said first solution in increments into said second solution to form a mixed solution and to obtain an acicular-shaped precipitate of an organic salt of said metal from said mixed solution;

separating said precipitate from said mixed solution;

drying said separated precipitate; and

firing said dried precipitate in an oxidizing atmosphere at a temperature for a time sufficient to convert said organic salt of said metal to acicular bodies of said inorganic compound of said metal;

wherein said metal is selected from the group consisting of Groups IIA, IIIA, IIIB, rare earth metals of the Periodic Table, and mixtures thereof.

[c20] 20.A method for producing acicular bodies of at least one inorganic compound of a metal comprising the steps of:

preparing a solution of a precursor of said inorganic compound of said metal to obtain a first solution;

preparing a solution of an ester of a dicarboxylic acid to obtain a second solution;

adding said first solution in increments into said second solution to form a

mixed solution and to obtain an acicular-shaped precipitate of an organic salt of said metal from said mixed solution;

separating said precipitate from said mixed solution;

drying said separated precipitate; and

firing said dried precipitate in an oxidizing atmosphere at a temperature for a time sufficient to convert said organic salt of said metal to acicular bodies of said inorganic compound of said metal;

wherein said metal is selected from the group consisting of scandium, yttrium, lanthanum, aluminum, gallium, indium, thallium, cesium, praseodymium, neodymium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, and mixtures thereof.

[c21] 21.A composite ceramic body comprising a ceramic matrix and acicular bodies of at least one inorganic compound of a metal selected from the group consisting of Groups IA, IB, IIA, IIB, IIIA, IIIB, IVA, IVB, VA, VB, VIA, VIB, VIA, VIIB, VIIIA, rare earth metals of the Periodic Table, and mixtures thereof; said acicular bodies being embedded in said ceramic matrix.

[c22] 22.A composite ceramic body comprising a ceramic matrix and acicular bodies of at least one inorganic compound of a metal selected from the group consisting of Groups IIA, IIIA, IIIB, IVA, rare earth metals of the Periodic Table, and mixtures thereof; said acicular bodies being embedded in said ceramic matrix.

[c23] 23.A composite ceramic body comprising a ceramic matrix and acicular bodies of at least one inorganic compound of a metal selected from the group consisting of scandium, yttrium, lanthanum, aluminum, gallium, indium, thallium, cesium, praseodymium, neodymium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, and mixtures thereof; said acicular bodies being embedded in said ceramic matrix.

[c24] 24.The composite ceramic body according to claim 23, wherein said ceramic matrix and said acicular bodies have a same composition.

[c25] 25.The composite ceramic body according to claim 24, wherein said composite ceramic body comprises a scintillator of a computed tomography x-ray system.

[c26] 26.A composite ceramic body comprising a polycrystalline alumina matrix and acicular bodies of alumina embedded therein.

[c27] 27.A composite ceramic body comprising a polycrystalline silica matrix and acicular bodies of silica embedded therein.

[c28] 28.A light pipe for transporting light, said light pipe comprising acicular bodies of at least one scintillating material.

[c29] 29.A composite ceramic body comprising a ceramic matrix and acicular bodies of at least one organic compound, wherein said acicular bodies substantially align in a direction of their longer axes.

Add 937

Add 027